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June 20, 2005

California Energy Commission
Dockets Unit
Attn: Docket No. 04-CCAC-1 and Docket No. 04-IEP-1B
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: Climate policy options (Docket No. 04-CCAC-1 and Docket No. 04-IEP-1B)

To the Climate Change Advisory Committee:

I am encouraged that the last meeting of the CCAC (April 6, 2005, [1]) included some discussion of vehicle feebates (by Greg Dierkers). Feebate-type policies can also be applied very effectively in the utility power sector, as evidenced by the Swedish nitrogen oxide program, and I recommend that the Commission investigate this approach as an alternative to cap-and-trade for reducing greenhouse gas emissions associated with electric power consumption in California, as well as transportation-related emissions.

The Swedish program uses a feebate-type regulatory instrument (aka. "Refunded Emission Payments", or REPs) to motivate NOx emissions reduction from regulated power plants. Emission charges ("fees") from plants with worse-than-average emissions performance are used to finance subsidies ("rebates") for plants with better-than-average performance, creating a competitive market incentive to reduce emissions. The program is entirely incentive-based and is revenue-neutral. There is no mandated emissions limit; instead the policy only mandates an "emissions price" that controls the level of fees and rebates. Nevertheless, the program has motivated power plant operators in Sweden to reduce NOx emissions far below levels achieved in the U. S. and other industrial countries.

The NOx program was enacted in 1990 (and took effect in 1992), and had the objective of achieving 35% reduction in NOx emissions from large combustion plants by 1995. However, the industry responded by immediately reducing emissions, so that the 35% target was already achieved in 1993; and by 1995 the average emissions intensity of regulated plants had decreased by 60% relative to 1990 levels [2, 3]. Costs related to emissions abatement and monitoring turned out to be lower than expected, so smaller plants were incorporated in the program in 1996 and 1997; and NOx emissions from Swedish coal-fired power plants in 2000 have been estimated to be about four times less than typical U. S. emissions, on a per-MWh basis (or about nine times less if cogeneration heat is included in the comparison) [4]. The feebate-induced electricity cost increase has been estimated to be only $0.0004/kWh [5].

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A primary advantage of feebates over cap-and-trade is that their market incentives operate to minimize emissions. Both approaches function to make emissions reduction profitable (from rebates or emissions trading), creating market incentives for firms to improve their emissions performance. In the case of feebates, a firm's improved emissions performance will tend to increase the competitive pressure on other firms to also reduce their emissions. With cap-and-trade, however, the better-performing firms' actions enable other firms to *increase* their emissions. (The sale of tradable emission credits allows buyers to increase their emissions, offsetting any market-incentivized emissions reduction.) Thus, under a cap-and-trade system the market incentives provide no environmental benefit; they merely operate to minimize regulatory compliance costs.

An additional advantage of feebates relative to cap-and-trade is that they eliminate the possibility of emissions price spikes and volatility, because the feebate emissions price is directly regulated.

The California Assembly just recently passed AB 1365, which establishes a near-term objective of achieving 7% reduction of GHG emissions in California, in 2010, relative to 1990 levels. The Governor's recent Executive Order (S-3-05) sets a more plausible target of reducing emissions to 2000 levels by 2010; but I am not aware of any regulatory proposals that would come anywhere near to achieving either target. For example, the largest source of GHG emissions in California is the automotive sector, which is addressed by AB 1493; but the AB 1493 regulations will not apply until 2009, and CARB projects that in 2010 emissions from cars and light-duty vehicles will be 11% higher than 2004 levels. Even in 2030, after almost the entire light-duty vehicle stock has been replaced by regulation-compliant vehicles, CARB projects that vehicle emissions will still be 8.7% higher than in 2004 [6]. Clearly, regulatory approaches of the type represented by AB 1493 fall far short of legislative policy objectives and are inadequate to the task of climate stabilization.

AB 1493's regulations are structured as a tradable performance standard (similar to cap-and-trade), but it is questionable whether this approach can actually achieve "maximum feasible and cost-effective reduction" of vehicular greenhouse gas emissions, as specified by the legislative mandate. CARB based the regulations on an extremely cost-conservative interpretation of the mandate. For example, "cost-effectiveness" was defined on the basis of a $1.74/gal fuel price (in 2004 dollars), which is assumed to apply over the 16-year life of a vehicle purchased after 2009. And hybrid vehicles, which represent one of the fastest growing automotive product segments, were considered to be "infeasible" for the purpose of determining the standard. This extreme cost-conservatism was necessary because although the legislative policy objective is to ensure cost-effectiveness, the standard-based regulations do not directly control costs – they control emission levels. Regulators have to predict what emission level will satisfy cost and feasibility constraints many years or decades in the future; and the emission caps must be set high enough to accommodate the uncertainty inherent in such projections. By contrast, there is no such predictive uncertainty with feebates because the emissions price, which limits feebate-induced abatement costs, is directly controlled by regulation.

The U. S. Acid Rain program also illustrates the effect of cost uncertainty in limiting regulatory effectiveness. The 1990 Clean Air Act Amendments were passed with the expectation that aggregate annual compliance costs for SO2 abatement would be as high as 5.9 billion dollars, but actual costs have turned out to be only about 1 billion dollars [7]. Had the costs been accurately predicted, SO2 caps could have been set at much more ambitious levels. Moreover, the costs of more stringent emission limits would certainly be justified by the benefits. Even ignoring the acid rain problem (which hasn't yet been solved [8]), the human health benefits would far outweigh additional costs. For example, scrubbers can remove SO2 for under $300/ton, whereas the health benefits of SO2 abatement are estimated at $7,300/ton [9]. But even with such a dramatic return on investment, the Acid Rain program provides no incentive to further reduce emissions, because its cap-and-trade mechanism functions to minimize compliance costs, and not to minimize emissions.

Under a feebate-type system such as Sweden's NOx program, emissions abatement incentives do not stop when emission levels reach some predetermined cap level; the incentives remain intact as industry further improves its emissions performance. Moreover, cost overestimation does not diminish policy effectiveness, as it does with cap-and-trade. For example, the Swedish NOx program's emissions price is higher than it might have been had abatement costs not been overestimated, resulting in *greater*-than-expected emissions reduction. Nevertheless, the regulation-induced abatement cost (e.g., $0.0004/kWh for NOx abatement) is guaranteed to be within limits of cost acceptability because the costs are limited by the mandated emissions price. Thus, with feebates cost overestimation tends to *increase* – not decrease – the regulatory policy's environmental effectiveness, but without compromising cost certainty.

Presently, climate-change initiatives at both the federal level and state level are focused almost exclusively on cap-and-trade-type approaches, but feebate-type policies represent a viable alternative that could overcome the practical limitations of cap-and-trade. (Environmental effectiveness is not the only problem with cap-and-trade – there are also issues related to initial allowance allocation, administrative complexity, and transaction costs.) The California legislature and other stakeholders in regulatory climate policy should be informed of the alternative approach represented by the Swedish NOx program, and I urge the Committee to include a balanced and objective evaluation of this option in your recommendations.

Sincerely,

Kenneth C. Johnson

References and endnotes:

[1] California Climate Change Advisory Committee
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[2] Ågren, C., 2000. Nitrogen oxides: Emissions charge works well. Acid News 2, pp. 1-4.
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http://www.rff.org/rff/RFF_Press/CustomBookPages/Choosing-Environmental-Policy.cfm
[Note: Millock and Sterner erroneously state the NOx emissions of Swedish coal power plants as 0.246 lbs per MWh thermal, or 0.56 lbs per MWh electric (p. 126). These values should be 0.246 kg per MWh, and 0.56 kg per MWh, respectively, or equivalently 0.542 lbs per MWh and 1.230 lbs per MWh. By comparison, typical U. S. coal plant emissions are 5 lbs per MWh.]

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[Note: Emission levels in 2004 and projections for 2010 and 2030 are stated in the ISOR, page 143, and in Table 8.2-1 (amended).]

[7] Burtraw, C., Palmer, K., 2003. The Paparazzi Take a Look at a Living Legend: The SO2 Cap-and-Trade Program for Power Plants in the United States. Discussion Paper 03-15. Published by Resources for the Future.
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